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18 July 1972

MEMORANDUM

The US Interdiction Campaign in North Vietnam

Conclusions

The US target system posited for the implementation of the air interdiction campaign in the JCS memorandum of 15 June has some significant strong points. The campaign -- Operation Linebacker -- is, for the most part, limited to those targets related to North Vietnam's war-supportive capability. The program avoids some of the diffusion of effort characteristic of the Rolling Thunder program and seems generally to conform to basic principles of sound target selection.

The program is profiting from a number of features absent from Rolling Thunder, such as the relatively decentralized management of the day-to-day effort and the introduction of improved technology. Furthermore, the rapidity with which the effort has been carried out, once launched, is in sharp contrast to the highly selective and relatively slow escalation of bombing during Rolling Thunder. The damage inflicted to major target systems generally has been just as great and sometimes greater than during Rolling Thunder. Whereas during Rolling Thunder, multiple strikes were needed to destroy or severely damage fixed targets, during Linebacker, only a single strike often has been required.

Any air interdiction program directed against North Vietnam and its war-making capability faces a number of impediments to success. Imports represent the principal source for military and related supplies, and the requirement for military goods in relation to total imports is small; North Vietnam possesses a diversified transportation system which has historically proven resilient to interdiction; North Vietnam's economy is a simple

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one, and the neutralization by bombing of the modern sector cannot hope to create economic disruption on a scale sufficient of itself to cripple Hanoi's war-making capabilities.

These considerations aside, Operation Linebacker does impose a meaningful and burdensome price on Hanoi for its persistence in sustaining offensive military action in South Vietnam. The destruction of much of its modern economy, painstakingly rebuilt since the Rolling Thunder program, cannot be viewed with indifference by the North Vietnamese leadership. An added price must also be paid in the need for further belt-tightening among North Vietnam's consumers. Once again, North Vietnam has been compelled to sacrifice years of economic development and to forgo orderly economic growth.

The attacks on the extensive land transport networks have brought extensive disruption to both commercial and military logistic activities and have undoubtedly forced the diversion of large amounts of manpower.

Some of the target systems taken under attack have probably already been neutralized to the maximum extent or were marginal target systems to begin with. Examples of the former are the modern industrial facilities which have been destroyed and can only be rebuilt over extended periods of time. These would include Hanoi's main electric power stations and the principal petroleum depots. Examples of marginal target systems include the military supply and dispersed storage facilities and transportation repair facilities. These targets -- with the possible exception of the initial attacks on the larger facilities -- are all likely to yield low returns and be difficult to keep interdicted.

As Linebacker continues, its major thrust must necessarily concentrate on the surface transportation systems and moving targets associated with logistic activities. The most profitable of these targets are the major import-carrying rail lines, the petroleum pipeline systems, and the large inventories of transport equipment.

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These are all difficult targets to interdict, and the results to be expected from our interdiction efforts are extremely sensitive to both the intensity of the attacks and the areas over which they are carried out. Most of these targets are concentrated in those parts of North Vietnam north of the 20th parallel -- an area which has accounted for only about 25% of the attack effort. Some 75% of the strike effort is south of the 20th parallel, an area in which the pertinent target system is extremely low-profile and so widely dispersed that the likelihood of inflicting significant damage to the logistic system is diminished greatly.

Finally, it should be noted that the sorties requirement for a sustained interdiction effort is far in excess of the number of sorties presently being flown. Some improvement in the sorties/target ratio can undoubtedly be made by a greater concentration of the current effort in areas where more lucrative target systems exist. Even then, the task of interdicting North Vietnam's transportation system is such a mammoth one that the current level of sorties cannot be expected to reduce the capacity of the system to a level at which it could no longer support the war.

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Introduction

1. At the personal request of the Secretary of Defense, this memorandum addresses two questions related to the current US interdiction campaign: is it soundly conceived and are its objectives likely to be met? These questions are discussed in the context of the program's objectives, the target system, and the plan of attack, as outlined in the 15 June 1972 memorandum for the Secretary of Defense from the Chairman, Joint Chiefs of Staff.

2. The current effort -- Operation Linebacker -- differs in important respects from the bombing campaign of 1965-68, and these differences make current analysis based on historical precedent a difficult and tricky business. Under the rules of the current program, there appears to be, for example, a much greater number of targets selected by field command than was the case in 1965-68. This decentralization undoubtedly gives a degree of flexibility to the program welcome to those responsible for its execution. The mining of the ports and harbors of North Vietnam simultaneously with the intensive aerial interdiction program is another important new ingredient for which there is no past precedent. Finally, it has been evident from the commencement of the current program that the technical aspects of the program -- notably the accuracy of the bombing -- represent a quantum step forward, compared to the observed efficiency of the 1965-68 effort.

The Objectives

3. The stated objectives of the current program are remarkably similar to those of the 1965-68 campaign: to reduce the enemy's military capability, to destroy the will of the regime to continue the war, and to bring Hanoi to the bargaining table. There appears now, however, to be a considerably higher order of realism in the textual commentary on the feasibility of achieving these goals than was the case during the early months of the 1965-68 campaign. The 15 June memorandum, for example, points out that "a valid estimate of the proportion of the (supply) flow

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that can be stopped, and the timing thereof, depends to a great degree upon enemy will and intentions; his recuperability; and his ability to control and support his transportation system under pressures it has never sustained." The memorandum further notes that "in the final analysis, a definitive schedule for achievement of US objectives cannot be developed." These propositions match our reading of the situation and seem to be entirely warranted for reasons set forth in the following sections.

North Vietnam as a Target

4. North Vietnam is far from an ideal setting for a successful strategic bombing program. First, except for its manpower and agricultural production, North Vietnam's own economy makes only a minimum contribution to the support of military operations. North Vietnamese industry has a very small capability to produce military equipment. All heavy military hardware, as well as most small arms, ammunition, and petroleum, must be imported from Communist countries.

5. Second, North Vietnam's economy is essentially agrarian. Its industries are generally simple and small-scale. This can be seen in the following tabulation, which shows the relative contributions of various sectors to national output.

<u>Economic Sector</u>	<u>Percent of National Output</u>
Agriculture	<u>50</u>
Industry	<u>25</u>
Central (modern)	10
Local and handicrafts	15
Construction	<u>5</u>
Commerce, transportation, and communications	<u>20</u>
Total	<u>100</u>

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Such an economy has substantial resiliency and capacity to resist economic collapse and requires comparatively few sophisticated inputs from domestic industry or from abroad to sustain production levels. We estimate that the annual imports to North Vietnam could be cut by over 50% of the 1971 level without affecting Hanoi's ability to prosecute its main force military effort in South Vietnam or undermining the economy in any vital way.

6. Third, the internal transportation system is, for a variety of reasons, relatively invulnerable to complete interdiction. When the US bombing commenced in 1965, North Vietnam already had a road, rail, and waterway system which was entirely adequate for its military and economic requirements. During the following years, the system was continually repaired, and its redundancy enhanced by new roads paralleling the old and a myriad of fords, ferries, and bridges at points vulnerable to attack. The tonnages that must move over the North Vietnamese transport system are small compared to the overall capacity of the system, and any bombing campaign directed at stopping the flow is caught up in a situation where diminishing returns from the effort expended set in very quickly.

7. Finally, any bombing campaign directed at denying war materiel to the front lines is faced with the fact that there is in existence a multitude of widely dispersed -- and generally highly secure -- storage areas in North Vietnam and along the enemy's supply corridors in southern Laos and northeastern Cambodia.

8. We have no way of estimating the sum total of such supplies, but there is substantial evidence that it is very large. During the course of the war, we have amassed a considerable body of information which reveals much about Communist stockpiling doctrine related to the war in Vietnam. In general, the doctrine is a conservative one. As a matter of policy, the North Vietnamese maintain large stockpiles of war materiel and do not prepare for offensive activity in a hand-to-mouth manner. Throughout the war, Communist forces

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appear to have adhered to a stockpiling concept that calls for large reserves of all basic equipment and supplies. Under ideal circumstances, the enemy's military stockpiles may equal as much as 21 months of anticipated requirements.

Target Selection and the Current Program

Introduction

9. The elements of the North Vietnamese setting discussed above act as constraints to the impact to be expected from any type of bombing program. They limited the effectiveness of the 1965-68 campaign, and they undoubtedly will be obstacles to the success of the current effort. This campaign seems, however, to have removed a number of the constraints that limited the 1965-68 campaign. The ground rules under which the program operated were highly restrictive, and rational principles of target selection were not always easy to follow. The air attack was fragmented on a variety of military and economic target systems, and the greatest weight of bombing was expended on the very diffuse (thus relatively invulnerable) transport network in the southern part of the country. The current campaign is not hamstrung by restrictions to nearly the degree that the former program was but nonetheless appears to be beset by some but by no means all of the former program's problems. In the following sections are listed some of the basic principles of target selection which we have considered as a basis for commentary on the current effort.

Some Principles of Target Selection

Use Pattern

10. This factor in target selection covers the extent to which a particular system really contributes to military output or to military operations, to civilian uses, to export, and so forth. A highly developed country, such as World War II Germany, presented a complex target system for analysts seeking to nullify its war-making potential with the greatest effective use of Allied bombing resources. The simple economy of North

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Vietnam does not pose the same problem (nor the same opportunities).

Depth

11. This factor covers the travel time of a product from the point of manufacture to the front-line strength of the enemy. Again, the North Vietnamese case is not a good one for direct application of this principle. However, if one assumes that the "point of manufacture" for war-related materiel (in this case, all imported) are North Vietnam's overland and maritime entry points, then the question can be raised if the greatest possible delays in receipt of military goods at the front are being considered in the target selection process.

Cushion

12. This factor includes a variety of considerations, such as the extent to which preattack consumption must be cut back before essential requirements are affected: the extent to which the enemy can employ substitute commodities; the size of stocks; goods in the pipeline; and the like. The most important factor with respect to cushion is the determination of the so-called "critical point" -- which is the point to which the output of the target industry or service may be reduced without serious effect. Below the critical point, the effects begin to be felt with increasing impact.

Target Vulnerability

13. This factor covers the appraisal of the physical vulnerability of a potential target system to attack by existing military means. The size of weaponry available and needed, the level of bombing accuracy which is achievable, the physical hardness of the target, and other pertinent considerations enter into this calculation.

Recuperation

14. This factor covers both the time and size of effort needed to repair or replace the essential parts of a damaged target system.

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The Principle of Concentration

15. This factor is of overriding importance in attacks on either tactical or strategic target systems. The principle of concentration fixes attention on two primary factors:

1. The essentiality of taking all, or the major part of any target system under attack in order to cut through the cushion.
2. The essentiality of concentrating the attack in point of time to overwhelm the ability to reconstruct, repair, or disperse.

The Current Program

Introduction

16. In general, target selection in the current program appears to follow many of the above guidelines. The exceptions will be discussed in detail in the sections which follow. There has not been, for example, a proliferation of strikes against unessential -- or marginally essential -- economic targets. Furthermore, the targets which have been selected have been matched -- thanks, in substantial part, to the "smart" bomb -- with appropriate strike action to a far greater degree than during the 1965-68 period. Finally, the program itself has been carried out in a much more concentrated fashion than that of 1965-68. It was not until the former bombing program was in its 23rd week that attack sorties exceeded 1,000 per week, and only twice in 1965 did sorties reach the current average of 1,500 per week.*

Transportation Targets

17. Operations against the North Vietnamese transportation system to date have effectively

* We note, however, that the current level of air interdiction -- an average of 210 attack sorties a day -- is substantially below the level of 380 attack sorties a day achieved at the height of the Rolling Thunder program.

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disrupted rail traffic throughout the country and limited operations to some light shuttle service, but they have had little permanent effect on highways or waterways. Although large numbers of bridges and transshipment areas associated with these modes have been attacked, traffic has been able to continue using alternate routes and by-passes. COMINT, pilot reports, and photography continue to reveal evidence of highway and waterway traffic along most routes in North Vietnam, and in some cases, pilots have indicated that traffic is "heavy" and that "numerous" trucks or watercraft are involved. The evidence we have from photography of increased activity in the Chinese rail yard at P'ing-hsiang (which feeds the North Vietnamese system) indicates that a large-scale truck transport effort is under way. Much of this activity takes place at night when both air attacks and reconnaissance missions are limited.

JCS Objective #1 -- The Rail Lines

18. This bombing objective is to disrupt the rail system sufficiently to render shuttling around the railroad cuts too expensive and repair too difficult to sustain substantial rail traffic.

19. In relation to this objective, none of the targets on the JCS list are "unnecessary," although several are more important than others. Thus, the destruction of the Hanoi Railroad/Highway (Doumer) Bridge over the Red River and the Hanoi Railroad/Highway Bridge over the Canal des Rapides would tie up more traffic and be more costly than the destruction of several smaller bridges or attacks against the Hanoi-Lao Cai line.

20. Several strikes have been directed against the Non Gay-Kep and Hanoi-Lao Cai lines -- both secondary routes -- while the more important and lucrative targets on the Dong Dang line -- the main overland import route -- were not restructed and were allowed to be reconstructed. On the other hand, the Vinh line has been badly mauled and kept under attack.

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21. Attacks on railroad/highway bridges have been extremely effective during the current program. In most cases, only the initial strike has been needed to knock out a bridge, unlike during Rolling Thunder when it often was necessary to hit a bridge repeatedly with large numbers of sorties before inflicting significant damage. A good example of this increased efficiency of Linebacker occurred on 11 June on the Dong Dang railroad line at Lang Giai and Lang Dang -- about 15 to 20 miles from China -- when a total of six bridges were hit and reported destroyed using only 20 MK-82 bombs. By comparison, during Rolling Thunder, a 1967 study of bombing effectiveness against 48 major bridges revealed that an average of only one bomb out of 47 hit a target and that an average of six sorties were required to interdict one bridge.

22. An "entirely effective" bombing campaign against a railroad system would mean the complete stopping of all rail transport operations. While a bombing program can interdict the system, force shuttling operations, and make the transport of goods more costly to the enemy, it cannot entirely stop traffic, since some limited amounts of goods could be shuttled between interdictions. Shuttling, for example, appears to be under way on the Dong Dang, Thai Nguyen, and Lao Cai lines despite the repeated interdictions.

23. Along with "disrupting" the system, a JCS objective is also to render repair too expensive. There is no way to judge what Hanoi's current tolerance is for such rebuilding activity, but during Rolling Thunder, repeated strikes against bridges were counteracted by extensive repair activities or the use of bypasses. Engineering troops and conscripted local workers responsible for preassigned targets frequently arrived at the bombed areas within one to three hours after a strike. At the height of the Rolling Thunder program, for example, there were 326 strikes against 52 JCS-targeted bridges, and the maximum repair times seldom extended more than a month and were occasionally just a few days. On the Hanoi-Dong Dang line, seven bridges were destroyed or damaged, and as a result, a total of 25 bypasses were built.

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24. While it is undoubtedly impossible to halt rail traffic altogether or -- judging from historical experience -- escalate the cost of countermeasures to a point which Hanoi could not support, some improvements in the program could be implemented. The program, for example, could be improved by concentrating systematic and repetitious attacks against targets on the Dong Dang and Thai Nguyen lines, which have been used to shuttle some goods into North Vietnam.

25. Many more sorties will need to be directed at primary targets. During Rolling Thunder, it was estimated that sustained interdiction of the land transport in the north -- principally directed at stopping through traffic on the major rail lines -- would require 3,000 sorties a month. Even granting the increased efficiency of the current program, there have been inadequate strikes against the railroad and railroad/highway bridges in the north -- only about 85 attack sorties have been flown against these targets, compared to 174 against relatively less important bridges in the south.

JCS Objective #2 -- Destroy Rolling Stock

26. This objective is to be accomplished by targeting rail yards and sidings and increasing the use of armed reconnaissance to seek out targets of opportunity.

27. US interdiction of rail lines in North Vietnam has stopped through rail service. As a result, rolling stock has accumulated along rail segments and at the larger rail yards. Attacks against these larger rail yards would disrupt operations and probably result in the destruction of stockpiled supplies. Some of the more important rail yards -- those at Thanh Hoa and Vinh -- at which sizable accumulations of rolling stock can be anticipated are excluded from the JCS target list. Other secondary yards on the JCS target list -- such as Hon Gay, Khe Se, and Uong Bi -- do not represent significant targets and are far less lucrative than those on the main Hanoi-Dong Dang line. The extent to which this objective will be met will depend on the degree to which attacks on the major yards are frequent and repetitive.

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28. Hanoi's success in countering attacks on its inventory of rolling stock will depend upon the willingness of its allies to maintain deliveries of replacement stock. During 1965-68, although the total volume of transport equipment reported destroyed and damaged was impressive (33 locomotives and 2,320 railroad cars destroyed), the impact of these losses on North Vietnam's transport capability was not significant. The railroad rolling stock inventory remained at the prebombing level. Thus far, 221 to 251 units of railroad equipment of all types have been reported destroyed, a fairly impressive total, but only a small dent in North Vietnam's inventory.

JCS Objective #3 -- Highways

29. This objective -- to reduce highway traffic and force trucks onto lesser capacity roads -- is relatively modest in its formulation but is perhaps the most difficult of all to attain. Heavy bombing against the highway system during Rolling Thunder failed to halt the flow of goods into and through the country.* The intervening years since Rolling

* A similar failure of bombing was graphically illustrated in southern Laos during the 1968/69 dry season. An intensive round-the-clock air interdiction campaign was carried out to reduce the flow of supplies into southern Laos and South Vietnam along the Ho Chi Minh Trail. This effort emphasized attacks against "chokepoints" -- river fords and road intersections chosen on the basis of their relative vulnerability to attack, difficulties in repairing them, and the lack of available bypass facilities. The bombing itself employed a variety of ordnance delivered by the same types of aircraft presently being used against similar targets in North Vietnam. Twice as many attack sorties were flown during the November 1968-April 1969 period in Laos than in North Vietnam a year earlier during the height of the bombing program there. The 470 sorties per day compares with the average of about 210 during the current Linebacker program in North Vietnam.

Even under this level of air interdiction, more tonnage moved through Laos than in any previous season, and resupply continued at an intensive pace during December-February, the months of peak bombing effort against the major chokepoints.

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Thunder have permitted the North Vietnamese to significantly upgrade their vehicle transport system by importing more and better trucks and road construction equipment and by stockpiling pontoon bridge sections and other maintenance equipment.

30. Cumulative Linebacker operations against the North Vietnamese transportation system to date have had no lasting effect on highways. There have been many reports of large volumes of truck traffic moving south from the PRC.

31. The targets listed by the JCS -- all north of 20° -- are necessary, and there appear to be no glaring omissions. The road system in northern North Vietnam is in relative terms far more lucrative than that in the Panhandle, where the actual volume of supplies moved is far less and widely dispersed. Despite these disproportions, only 39 highway bridges have been struck in northern North Vietnam, while 486 bridges have been struck in the Panhandle. Regardless of the area of concentration of the attacks against highways, it should be noted that the North Vietnamese road network is so highly redundant and well-constructed and is such a low-density target system that the prospects of reducing highway traffic to critical points are remote indeed.

JCS Objective #4 -- Truck Attrition

32. This objective is to be met by direct attacks on both truck parks and against trucks on the move, thus bringing the remaining truck resources to the point of breakdown.

33. The objective is an ambitious one in view of the fact that the North Vietnamese inventory is currently between 18,000 and 23,000 vehicles and is continually being fed with trucks from the USSR and PRC. While it is probably true that upwards of 10,000 of the total inventory are in the Hanoi/Haiphong and Dong Dang areas as suggested by the JCS memorandum, only a relatively small share of the total is concentrated in truck parks. Strikes against the truck parks listed (particularly against that at Dong Dang) might well bring several thousand trucks -- the JCS suggests 4,000 -- under attack. But it would be optimistic to anticipate that actual losses would approach this figure. Of the some 4,000 trucks reported to have been sighted by

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pilots thus far in the campaign, only about 700 have been reported destroyed and 500 damaged.* From the point of view of cost-effectiveness, attacks against the parks offer the best means of attriting trucks. Thus far during the current bombing program, truck "kills" due to armed reconnaissance attacks have averaged about one truck per 24 sorties (directed at all types of targets). During Rolling Thunder in 1967, the ratio was 34 sorties to one truck kill. The truck kill performance reported in southern Laos this past season has been considerably better -- seven sorties to one truck -- due to the concentration on this type of target and, most importantly, to the use of gunships, which have been a very successful weapon against trucks (though highly vulnerable to a SAM or AAA threat).

34. During the next few months (July-September), North Vietnam must come to grips with the wet monsoon season, which traditionally causes extensive flooding and seriously restricts overland travel. During this period, secondary and some primary roads become unuseable, and makeshift bridge and ferry facilities bypassing the many downed permanent structures become hazardous to use or inoperable because of high water and swift currents. Thus, truck traffic must be funneled over a much smaller net of serviceable highways, and many key crossings become bottlenecks.

35. If a concentrated program were launched against trucks during the season, programming many nights flights and possibly even using gunships along the PRC-North Vietnam border, it is likely that the total truck kills will increase markedly. However, even if it were theoretically possible to seek out and destroy the majority of the trucks currently in the inventory, imports from Hanoi's allies would prevent truck resources from reaching the "point of breakdown." Furthermore, the narrowing of the program to trucks would mean

* Such reporting, based on sightings by pilots during the heat of combat, carries a built-in risk of exaggeration. The Washington intelligence community, for its accounting purposes, has developed a formulation "effective truck losses" which includes 75% of all trucks reported destroyed and 25% of all trucks reported damaged.

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the sacrifice of other targets -- for example, bridges, which represent a higher replacement cost to the enemy.

JCS Objective #5 -- Deny Access of International Shipping

36. This objective is tied to the mining program and to certain unspecified surface/air actions. Our observations will be confined to the mining program as we have observed it thus far.

37. Since mine activation on 11 May, no vessels have transited the minefields sealing off the major North Vietnamese deep-water ports of Haiphong, Cam Pha, and Hon Gay. As such, the mining program has effectively denied to the enemy use of these heretofore gateway areas for the influx of supplies.

38. The impact of the mining program elsewhere along the North Vietnamese coastline is less certain. There are definite signs of leakage at such places as the Hon Nieu anchorage serving Vinh and at Hon La Island 75 miles to the south. Both areas reportedly have been mined and reseeded with mines, but lightering activity is taking place.

39. There are a number of reasons why the mining program cannot be entirely effective against the entire target areas. Totally sealing off the coastline of some 650 miles may indeed be impossible. All along the coast, small craft can be beached and directly offloaded, and these activities can go on during night periods, when surveillance capabilities are seriously degraded. Further, there have recently been reports that the Chinese may attempt to move junks from their southern port of Pei Hai into the unmined back channels north of Cam Pha. This water labyrinth may prove exceedingly difficult to close off altogether. Barring an all-out and massive effort, we would not anticipate that these efforts would result in any substantial replacement of the supplies normally imported by sea.

JCS Objective #6 -- Curtail Coastal Shipping

40. The transshipment points listed in this objective represent a reasonable target selection and, if attacked frequently, would hamper coastal shipping to a significant degree. While it is true that

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effectively denying to the enemy the use of coastal waterways would place an additional burden on land LOC's and the inland waterways, it is doubtful that such a burden would be unmanageable. The vast bulk of coastal shipping has traditionally been of low-priority goods, many of which would simply not be moved at all. Furthermore, in the last several years, the overall importance of coastal shipping to the economy -- and certainly to the war effort -- has declined, as more efficient inland means, such as, for example, the North-South pipeline, have been developed.

JCS Objectives #7 and #8 -- Deny Free Movement on Inland Waterways and Attack Watercraft

41. The supporting statement on this objective correctly notes that the waterway system is relatively invulnerable to attack. It is proposed that a combination of efforts would partially overcome this: strike certain key transshipment points, seed rivers with mines, and direct armed reconnaissance strikes against watercraft.

42. While we have no means of judging what level of effort would be required to successfully interdict the movement of supplies on the many major waterways in North Vietnam, it seems a certainty that it would be far in excess of the total sorties now being flown. The transshipment facilities listed, while major ones, represent only a few of many and, in any case, if destroyed would soon be replaced with makeshift arrangements. Mining of the inland waters was tried, with relatively little success, during Rolling Thunder. The mines were detonated in simple sweeping operations, and traffic was little impeded. Watercraft are exceedingly difficult to destroy by air, as evidenced by the fact that pilots have thus far reported sighting over 4,500 during the current campaign but claim to have destroyed only about 850.

JCS Objective #9 -- Reduce North Vietnam's Capability to Repair Transportation Equipment

43. This objective includes as targets several railroad repair shops, vehicle repair facilities, plants near Hanoi producing tires and batteries, and several facilities related to the repair of watercraft.

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44. The railroad repair shops probably represent valid targets, the destruction of which would considerably impair North Vietnam's ability to maintain its rolling stock. Strikes against the vehicle repair facilities would have little impact on the trucking situation. Throughout North Vietnam, there are small workshops where truck repairs can be made. Strikes against the tire and battery factories would mean little to Hanoi, imports being the only significant source for such items. With the ports mined and large vessels denied the use of the coastal waterways, it is difficult to see much value in directing strikes at ship maintenance facilities. The numerous small boats that will continue to move within North Vietnam (almost regardless of the level of the interdiction effort) do not require maintenance yards.

JCS Objective #10 -- Destroy War Stocks

45. This objective is to be met by striking certain key military supply facilities. Of all the targeting in the current program, this one most clearly violates principles of sound target selection. Even though the initial strikes at the onset of Linebacker might have found some facilities well-stocked, we judge, based on experience during Rolling Thunder, that these facilities were quickly emptied and now represent a marginal target system.

46. As indicated earlier in this memorandum, Hanoi's stockpiling philosophy is a very conservative one; military stocks are very large in the aggregate, and the stockpiles are well dispersed throughout the country.

47. Any evaluation of the effect of the bombing strikes on North Vietnam's supply position must consider the Communist logistic position at the time the operation began with the launching of the annual dry season "General Transportation Offensive" in southern Laos in early January. Facilitated by a considerable road construction effort and restructured logistic apparatus, very large quantities of supplies were moved from North Vietnam through the Laos Panhandle into Cambodia and South Vietnam. Also, new roads were constructed through the DMZ, and substantial stockpiles were amassed in and near the battle areas.

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48. Once the North Vietnamese kicked off their offensive on 30 March, logistic activity throughout southern Laos and Cambodia increased sharply above already high levels. Further, the Communists made very heavy use of the routes through the DMZ to transport supplies into MR 1. This logistic momentum was maintained for the most part through May.

49. The unprecedented supply campaign in the Laos Panhandle during the 1971/72 dry season (October-May) -- combined with the heavy use of the DMZ roads since March -- resulted in record supply deliveries to South Vietnam and allowed the enemy to establish substantial stockpiles sufficient to support their offensive in South Vietnam for a number of months. Furthermore, the resupply and repositioning of stockpiles continue.

50. To increase the effectiveness of air strikes, the bombing of storage areas would, at the least, have to be more systematic and repetitious than is presently the case. US attacks would have to keep pace with the enemy's dispersal program. However, attacks against storage facilities already represent about 10% of total, and a more concentrated effort would mean an even greater imbalance in the program -- with very questionable chances of success.

*JCS Objective #11 -- Seriously Disrupt
the North Vietnam POL System*

51. This objective seeks, through concentrated bombing of POL storage facilities and pipelines, to deny the North Vietnamese army sufficient POL to sustain the current offensive.

52. There is little question that POL represents the most critical commodity facing the North Vietnamese in pursuit of their war aims. Traditionally, they have imported an average of about 1,000 tons per day, mainly by sea; of this, we estimate that direct military requirements at the present rate of expenditure are about 330 tons daily. Strikes against petroleum storage facilities thus have reduced the capacity of North Vietnam's principal petroleum storage facilities from 68,000 to 37,000 metric tons. Dispersed storage --

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both tanks and drums -- has not been seriously affected, however, and the petroleum supply situation should be eased with completion of the new pipeline between China and North Vietnam and supplemental shipments by truck or rail sent from China. Stocks of petroleum have been drawn down to an estimated 41,000 to 65,000 tons, or between 41 and 65 days of supply as of 30 June.*

53. While the fixed storage facilities listed appear to be reasonable targets, those that have yet to be struck probably contain significantly smaller quantities of petroleum than normal, and the loss of petroleum per unit of storage capacity destroyed will continue to decline.

54. Neither of the principal storage terminals at Hanoi or Haiphong appear now to be worthwhile targets. Most or all of the petroleum remaining at those terminals after the mid-April bombings probably has been removed, and there are only four tanks of 500 tons and larger capacity remaining at Hanoi and three tanks of 600 tons and larger capacity at Haiphong. Of the other principal terminals, Nguyen Khe and Ha Gai storage sites appear to have sufficient storage capacity to warrant attack. Both of these sites, however, contain hardened and/or hidden tanks that survived attacks during Rolling Thunder.

55. There were more than 200 dispersed tanks in North Vietnam at the beginning of 1972. Bombing of these targets has been reported by pilots as difficult to impossible, and they still represent some 84,000 tons of storage capacity available to Hanoi.

56. The real issue, then, for any future targeting is what may be done to prevent the North Vietnamese from rebuilding stocks. It is unlikely that any bombing program *per se* would be entirely effective in depriving North Vietnam of imports of petroleum. However, continued denial of seaborne imports of petroleum, together with sustained bombing of truck and rail traffic, of the new pipeline

* This estimate is based on assumed consumption of stocks on hand at the beginning of Operation Linebacker and makes no allowance for imports since that date.

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segment between Hanoi and Dong Dang, and of dispersed storage sites along the pipeline right-of-way, would probably yield better results than continued bombing of petroleum storage sites elsewhere in North Vietnam.

JCS Objective #12 -- Destroy Major Power Facilities

57. This objective is intended to eliminate the major power sources for Hanoi and Haiphong and other industrial complexes elsewhere in northern North Vietnam. These attacks may have a great psychological impact on the populace but will have only an indirect impact on the North Vietnamese ability to wage war.

58. The targets listed have been judiciously selected and the bombing thus far well-executed. Attacks against powerplants have put out of commission more than 75% of North Vietnam's total of 260,000 kilowatts of generating capacity. Except for one remaining large powerplant in Hanoi, the Red River Delta has had to fall back on diesel-driven generators and a few scattered agricultural hydroelectric powerplants. In virtually every case, North Vietnam's major powerplants have been damaged during a single raid of only a few planes. In contrast, it took over two years to do comparable damage during Rolling Thunder.

59. The cumulative impact of bombing North Vietnam's electric power facilities is being felt primarily in the industrial sector. Power shortages by mid-June undoubtedly had shut down a large part of modern and local industry.

60. In addition to the electric power facilities, the bombing thus far has included strikes against other economic targets. (Most are not listed in the JCS memorandum.) While there have been far fewer strikes against manufacturing installations than during Rolling Thunder, the targets struck thus far rank among the most important in the modern sector of industry. The list includes North Vietnam's only iron and steel combine, the largest single industrial complex in the country; the Nam Dinh Textile Plant and the Viet Tri Chemical Complex, the largest such facilities in

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North Vietnam; the Haiphong Cement Plant, North Vietnam's only significant producer of cement; and the Hon Gay Coal Processing Plant, second largest of the two main coal-grading plants. No attempt to repair damage to any of these facilities has yet been observed.

61. Some of the bombing in the southern part of the country has included targets of minor economic importance, such as the Phu Ly Sugar Refinery and the Vinh Wood Processing Plant. But, in the main, the very restricted targeting of the economy thus far has seemed sound.

62. Whether or not any of the bombing will have a significant psychological effect remains to be seen. The regime cannot but be impressed with the results of the bombing thus far. For example, use of "smart" bombs has made the current program against electric power extremely effective. The Thac Ba hydroelectric powerplant, which represents some 40% of total generating capacity in the country, was severely damaged in only two strikes with only nominal attendant destruction in the vicinity. One strike against the Thai Nguyen thermal powerplant inflicted damage comparable to that requiring 10 strikes under Rolling Thunder. The Thanh Hoa thermal powerplant suffered near total destruction in one strike, compared to Rolling Thunder strikes numbering six in 1965, four in 1966, and one in 1967.

63. In the final analysis, since North Vietnam is essentially a subsistence economy, the loss of industrial production will probably have almost no impact on the great mass of this agrarian society. The small element of the population directly affected would probably not be sufficient, or disposed or able, to persuade the regime to stop the war.

*JCS Objective #13 -- Deny USSR/PRC
Access to Airfields*

64. This objective is intended to prevent either the USSR or the PRC from initiating a major aerial resupply effort. The targets listed are the correct ones and, as targets, are highly visible and relatively vulnerable to bombing. They are big,

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are not located near civilian populations, and include associated facilities (hangars, revetments, maintenance and storage depots, and taxiways) that are also vulnerable and usually exposed. However, experience during Rolling Thunder does not bode well for a successful, sustained interdiction of these fields. During 1966-67, all of North Vietnam's six major airfields were repeatedly struck, but all continued to support some level of traffic. At Phuc Yen, for example, following heavy strikes in October 1967, the runway was sufficiently repaired within three days to allow at least limited MIG operations.

JCS Objective #14 -- Disrupt Major Communications and Command and Control

65. The targets listed -- six in number -- include five high frequency (HF) point-to-point transmitting facilities and one radio transmitting point/antennae array (at Me Tri) which handles all of Hanoi's domestic and international propaganda broadcasts.

66. On point-to-point broadcasting (which services military and Party command and administrative requirements), aside from the five HF facilities specifically noted (by the JCS), there are at least 17 others of considerable (perhaps equal) importance to North Vietnam's domestic and international telecommunications. Even if all these facilities were bombed, the North Vietnamese could probably take almost immediate steps to prevent anything more than temporary, localized disruption of command communications Hanoi regarded as critical. ("Communications," as used here, does not include voice radio broadcasts, which are discussed in the next paragraph.) In addition to its major fixed radio installations, North Vietnam has available several hundred small HF radio communications facilities, almost all of which are readily transportable and easily concealed from detection by air. The North Vietnamese also operate and maintain an extensive wireline system, augmented by a rapidly expanding microwave radio relay network. Together, these provide North Vietnam with a telecommunications base almost impossible to eliminate. The availability of these alternate facilities almost

certainly assures that, except for brief and probably localized disruptions, the flow of what the DRV leadership considered essential military, economic and administrative traffic could be sustained. The loss of the five primary HF sites, however, would obviously create some measure of confusion and adversely affect the efficiency of Hanoi's overall communications network until the sites were repaired or fully replaced. Full repair or replacement, furthermore, would involve considerable cost and probably at least some equipment not now available in North Vietnam.

67. The picture is somewhat different with respect to domestic and international voice radio broadcasts, i.e., AM broadcasts on both standard and short wave.* The Me Tri transmitter complex and antennae array services the domestic and international output of Radio Hanoi, Liberation Radio (i.e., the ostensible voice of the NLF/PRG), the Voice of Sihanouk and of the Pathet Lao. Me Tri is not a part of Hanoi's command and control (i.e., administrative net) communications system. A severe, successful attack on Me Tri would silence for a period of time Radio Hanoi, Liberation Radio, and the Sihanouk and Pathet Lao radios. Through various types of jury rigs, propaganda/voice output coverage of some local areas could probably be resumed within several hours or a few days (e.g., within Hanoi itself, Radio Hanoi's domestic output could probably be piped over the electrical systems in the way that many college or university radio stations in the US reach their specialized audience in their institutions' dormitories). Severe damage to the Me Tri complex, however, would deprive the North Vietnamese of their principal domestic and international propaganda outlet for both overt and covert (i.e., clandestine) radio broadcasting for a considerable period of time.

* We would note that without North Vietnam's radio broadcasts, the US Government would lose one of its main windows for observing the reactions and attitudes of the Hanoi government.